8. REGULATIONS AND ADVISORIES

The international, national, and state regulations and guidelines regarding chlorine dioxide and chlorite in air, water, and other media are summarized in Table 8-l.

ATSDR has derived an intermediate-duration inhalation MRL of 0.001 ppm (0.003 mg/m^3) for chlorine dioxide based on a LOAEL of 1 ppm for respiratory effects (peribronchiolar edema and vascular congestion in the lungs) in rats exposed to chlorine dioxide vapors 5 hours/day, 5 days/week for 2 months (Paulet and Desbrousses 1972). The LOAEL was converted to a $LOAEL_{HEC}$ of 0.3 ppm and divided by an uncertainty factor of 300 (3 for interspecies extrapolation using dosimetric adjustments, 10 for the use of a LOAEL, and 10 to account for sensitive populations).

ATSDR has derived an intermediate-duration oral MRL of 0.1 mg/kg/day for chlorite based on a NOAEL of 2.9 mg chlorite/kg/day and a LOAEL of 5.7 mg chlorite/kg/day for neurodevelopmental effects (lowered auditory startle amplitude) in rat pups that had been exposed throughout gestation and lactation via their mothers (Gill et al. 2000; same study as CMA 1996). The NOAEL of 2.9 mg chlorite/kg/day was divided by an uncertainty factor of 30 (10 for interspecies extrapolation and 3 to account for sensitive populations).

ATSDR considered the intermediate-duration oral MRL for chlorite to be applicable to chlorine dioxide as well.

EPA (IRIS 2002) has derived an RfC of $2x10^{-4}$ mg/m^3 for chlorine dioxide based on a LOAEL of 2.76 mg/m^3 (1 ppm) for respiratory effects (peribronchiolar edema and vascular congestion in the lungs) in rats exposed to chlorine dioxide vapors 5 hours/day, 5 days/week for 2 months (Paulet and Desbrousses 1972). The LOAEL was converted to a $LOAEL_{HEC}$ of 0.64 mg/m^3 and divided by an uncertainty factor of 3,000 (10 for extrapolation of a chronic RfC from a subchronic study, 3 for interspecies extrapolation using dosimetric adjustments, 10 for intrahuman variability, and 10 to account for extrapolation from a LOAEL for mild effects and for the lack of inhalation developmental and reproductive toxicity studies).

EPA (IRIS 2002) has derived an RfD of $3x10^{-2}$ mg/kg/day for chlorite based on a NOAEL of 3 mg/kg/day for neurodevelopmental effects in rat pups that had been exposed throughout gestation and lactation via

Table 8-1. Regulations and Guidelines Applicable to Chlorine Dioxide and Chlorite

Agency	Description	Information	Reference
INTERNATIONAL Guidelines:			
IARC	Carcinogenicity classification Sodium chlorite	 Group 3[a]	IARC 2002
NATIONAL Regulations and Guidelines:			
a. Air			
ACGIH	TLV (8-hour TWA) TLV-STEL (15-minute TWA)	0.1 ppm 0.3 ppm	ACGIH 2001
EPA	Chemical accident prevention Toxic endpoint	 2.8×10^{-3} mg/L	EPA 2002b 40CFR68, Appendix A
	Regulated toxic substance for accidental release prevention[b] Threshold quantity	 1,000 pounds	EPA 2002a 40CFR68.130, Table 1
NIOSH	TWA-REL (10-hour TWA) STEL (15-minute TWA) IDLH	0.1 ppm 0.3 ppm 5 ppm	NIOSH 2002
OSHA	PEL (8-hour TWA) for general industry	0.1 ppm	OSHA 2002b 29CFR1910.1000
	Highly hazardous chemical for general industry Threshold quantity	 1,000 pounds	OSHA 2002c 29CFR1910.119, Appendix A
	PEL (8-hour TWA) for construction industry	0.1 ppm	OSHA 2002a 29CFR1926.55
	Highly hazardous chemical for construction industry Threshold quantity	 1,000 pounds	OSHA 2002d 29CFR1926.64, Appendix A
b. Water			
EPA	Maximum contaminant level Chlorite	 1.0 mg/L	EPA 2002e 40CFR141.64(a)
	Maximum contaminant level goal Chlorite	 0.8 mg/L	EPA 2002f 40CFR141.53
	Maximum residual disinfectant level	0.8 mg/L	EPA 2002g 40CFR141.65(a)

Table 8-1. Regulations and Guidelines Applicable to Chlorine Dioxide and Chlorite (*continued*)

Agency	Description	Information	Reference
NATIONAL *(cont.)*			
	Maximum residual disinfectant level goal	0.8 mg/L	EPA 2002h 40CFR141.54
c. Food			
EPA	Exemption from the requirement of a tolerance—sodium chlorite	For residues as a seed -soak treatment in growing *Brassica* (cole) leafy vegetables and radishes	EPA 2002j 40CFR180.1070
FDA	Direct food additive permitted in food for human consumption; used as an antimicrobial agent in water used in poultry processing and to wash fruits and vegetables	Not to exceed 3 ppm	FDA 2001e 21CFR173.300
	Direct food additive permitted in food for human consumption; used as an antimicrobial agent—acidified sodium chlorite	Used at levels from 50–1,500 ppm	FDA 2001d 21CFR173.325
	Indirect food additive; adjuvants, production aids, and sanitizers		FDA 2001b 21CFR178.1010
	Indirect food substance affirmed as generally recognized as safe; used as a slimicide in the manufacture of paper and paper-board that contact food—sodium chlorite	Used at levels from 125–250 ppm	FDA 2001c 21CFR186.1750
	Substance for use only as components of adhesives—sodium chlorite		FDA 2001a 21CFR175.105 (c)(5)
d. Other			
EPA	Chlorine dioxide		IRIS 2002
	Carcinogenicity classification	Group D[c]	
	RfC	$2x10^{-4}$ mg/m^3	
	RfD	$3x10^{-2}$ mg/kg/day	
	Chlorite		IRIS 2002
	Carcinogenicity classification	Group D[c]	
	RfC	No data	
	RfD	$3x10^{-2}$ mg/kg/day	

Table 8-1. Regulations and Guidelines Applicable to Chlorine Dioxide and Chlorite (*continued*)

Agency	Description	Information	Reference
NATIONAL *(cont.)*			
	Potentially incompatible waste; potential consequence of mixing Group 6-A (chlorite) with Group 6-B	Fire, explosion, or violent reaction	EPA 2002i 40CFR264, Appendix V
EPA	Toxic chemical release reporting; community right-to-know; effective date for reporting	01/01/87	EPA 2002k 40CFR372.65(a)
STATE Regulations and Guidelines:			
a. Air			
Louisiana	Toxic air pollutant[d]		BNA 2001
	Minimum emission rate	25 pounds/year	
New Mexico	Toxic air pollutant		BNA 2001
	OEL	0.3 mg/m^3	
	Emissions	0.02 pounds/hour	
Vermont	Hazardous air contaminant		BNA 2001
b. Water			
Maine	Drinking water guideline		HSDB 2002
	Chlorine dioxide	60 µg/L	
	Chlorite	7 µg/L	
c. Food	No data		
d. Other			
Florida	Toxic substance in the workplace		BNA 2001

[a]Group 3: not classifiable as to its carcinogenicity to humans
[b]Basis for listing: toxic gas
[c]Group D: not classifiable as to human carcinogenicity
[d]Class II: suspected human carcinogen and known or suspected human reproductive toxin

ACGIH = American Conference of Governmental Industrial Hygienists; BNA = Bureau of National Affairs; CFR = Code of Federal Regulations; EPA = Environmental Protection Agency; FDA = Food and Drug Administration; HSDB = Hazardous Substances Data Bank; IARC = International Agency for Research on Cancer; IDLH = immediately dangerous to life and health; IRIS = Integrated Risk Information System; NIOSH = National Institute for Occupational Safety and Health; OEL = occupational exposure limit; OSHA = Occupational Safety and Health Administration; PEL = permissible exposure limit; ppm = parts per million; REL = recommended exposure limit; RfC = inhalation reference concentration; RfD = oral reference dose; STEL = short-term exposure limit; TLV = threshold limit value; TWA = time-weighted average

their mothers (CMA 1996; same study as Gill et al. 2000). The NOAEL of 3 mg chlorite/kg/day was divided by an uncertainty factor of 100 (10 for interspecies extrapolation and 10 to account for sensitive populations).

EPA (IRIS 2002) considered the RfD for chlorite to be applicable to chlorine dioxide as well.